Results

1. The lake level in the crater rises and ponds to maximum depth. Eventually the crater rim is overtopped and breached. (fig a)
2. Lobate patterns develop due to large sediment transport and infiltration (fig a)
3. Incision starts immediately and increases when the channel starts to develop further downhill. When the new gradient develops closer to an equilibrium, the incision slows down and widening starts. Developing U or box-shaped channels. (fig b, c)
4. Because of incision and lateral movement river terraces are formed. (fig d)
5. At certain points during the experiment the banks become too steep and sometimes overhanging which results in mass wasting processes. (fig d)
6. Erosional morphology develops in crater: inlet fan. (fig e)

Conclusion

• Experiments show that outflow channels are formed by short episodic flows rather than long duration sustained flow. Therefore the floodings could be caused by rapid local processes such as young volcanism, crater impacts, hydrothermal activity and acidic or salt containing flows.
• The experiments produce channels similar to those on Mars in a matter of minutes, indicating that crater-lake floodings are catastrophic events. The necessary climate conditions associated with ponding water are key in reconstructing and understanding the Martian climate history.

Discussion

Experiments show similar morphologies to Mars? Yes
1. Channel bank collapse

Multiple events necessary for terrace development? No
2. Fan-like morphology Aram Chaos created by crater-lake flooding? Yes
3. Duration of the process is long/short? Short

Summerised
1. Multiple events necessary to develop outflow channels? No
2. Long term climate change necessary to develop outflow channels? No

Likely causes are local catastrophic processes
• Young volcanism
• Crater impacts
• Hydrothermal activity

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References